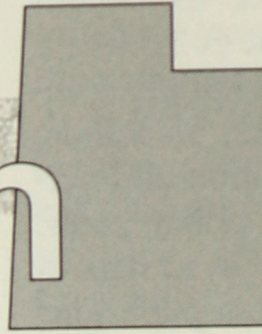# Utah

Utah built a statewide perspective on GIS in the early 1980s, and since then twice changed the institutional location of statewide GIS services and coordination. The most recent organizational structure was authorized by the legislature in 1991 through Senate Bill 21. The Automated Geographic Reference Center (AGRC) was established in the Department of Natural Resources in 1981, then transferred to the Office of Planning and Budget (OPB) in 1986, and then was organizationally separated in 1989. At that time, planning and coordination functions stayed at the Governor's Office of Planning and Budget with a State GIS Coordinator. The service bureau component of AGRC was transferred to the Division of Information Technology Services (ITS) within the Department of Administrative Services (DAS). Senate Bill 21 also authorizes the State Geographic Information Database (SGID) and requires agencies to participate in its development. In addition to efforts in these central offices, GIS activities are also underway in the Department of Natural Resources which is developing a department-wide approach to GIS with various existing activities in its divisions. Coordination groups include the Utah Geographic Information Council, endorsed by the Governor and legislature, the GIS Advisory Committee, a State Mapping Advisory Committee, and groups specifically for soil and wetlands data.

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Origins of State Initiatives

Utah has a long history of geographic information development and GIS activity, and was one of the first states in the nation to institutionalize a statewide coordination and development approach. The earliest geographic information efforts in Utah began in the Department of Natural Resources (DNR). For example, efforts were initiated in the mid-1960s to begin a state water plan. Since much information was needed to develop the plan, the DNR's Division of Water Resources began a thorough mapping effort of the state's 11 basins and its water supply.

Geographic information coordination activities in Utah originated in 1977, when Governor Scott Matheson requested a study to develop recommendations for a centralized database management

system. An inter-agency committee was formed to determine statistics and geographic data needs of each agency, which were documented in a data dictionary in November, 1978. The established set of goals and objectives emphasized the need for a geographic database that would assist in resource management, planning and interagency coordination. GIS pilot projects and existing departmental functions during 1979 and 1980 reinforced the need for multi-purpose data.

In 1980, ESRI was contracted in a consulting role to assist with a plan for GIS implementation. It recommended a centralized computer facility including the development of a database that would provide for a "standardized approach for data format, uniformity of scale and compatibility of data elements." ESRI's software and hard-

ware were installed in June 1981, and the agency contracted also to provide training and to digitize data. DNR's Automated Geographic Reference (AGR) division was officially established in 1982, which focuses on natural resource applications.

In 1983 a GIS steering committee was created to assess the usefulness of GIS in state government and to support and enhance decision-making in various agencies in state government. Its scope included natural, cultural and economic data, and potential GIS users were identified as state or local government agencies, and possibly private sector entities. The committee recommended the formation of a single functional GIS work unit, the purchase of state-of-the-art hardware and software, and the relocation of AGR to a more central office of state government.

Following these recommendations, a Prime minicomputer and ARC/INFO software were installed in 1984. An AGR Task Force was established that included representatives of DNR, the Office of Planning and Budget (OPB), and the Department of Administrative Services' (DAS) Division of Data Processing (renamed the Division of Information Technology Services (ITS) in 1990). The task force was charged with developing GIS into a viable technology for statewide needs. One of the task force's first efforts was a project for mapping and analysis of site visibility for a proposed nuclear waste repository near Canyonlands National Park in southern Utah. Also in 1984, the state contracted with Price-Waterhouse to prepare a "strategic approach" for implementation of GIS in Utah. Their recommendations included using successful completion of project work as a means to promote AGR and to create data for subsequent uses; to provide additional support and training for the user community; and to develop database architecture and standards.

By the mid-1980s, a variety of agencies were using GIS, including four divisions within DNR, the Tax Commission, the Department of Agriculture, and the Department of Community and Economic Development. Some of these agencies purchased hardware to provide remote access to AGR's GIS. Some federal and local agencies were also AGR customers, with the center experiencing an average annual growth rate of approximately 20%. Though a variety of agencies were contributing and using AGR services, with DNR as the largest user, some concerns for improvement were expressed. While there was increasing demand for agency-specific needs, there was also recognition for statewide needs. Additional funding and commitment by agency leaders was also recognized as necessary to maximize the value of GIS to meet state needs.

Accordingly, AGR was transferred to the Office of Planning and Budget (OPB) in 1986 because it was believed that better and more neutral services could be provided by this office rather than within a functional agency. AGR's mission was redefined as one which would "encourage and facilitate effective GIS implementation in Utah and develop and direct this process in state government." It provided leadership and coordination in the development and effective use of GIS in state, federal and local agencies. AGR was also charged to serve as an "implementation authority" providing services under contract to all levels of government. With the maximum authorized staff of 11 people, and a budget of over $400,000 in the mid-1980s, about half of its funding was dependent on a fee-for-service basis. With this move, AGR's funding was more limited and dependent on contract project work for revenue. The task force was discontinued.

Since the early 1980s, Utah has been a leading state regarding the institutionalization of statewide geographic information coordination and development.

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As demand and usage continued to grow, a request was issued later in 1986 for proposals to provide statewide contracts for products to "facilitate the implementation of a strategy to continue to systematically meet the demand for integration and use of automated methods for capture, analysis and display of geographically referenced spatial data." A purchase agreement was later awarded to ESRI which helped establish ARC/INFO as Utah's GIS software standard.

Usage and applications continued to increase after 1986, and the state evaluated again the institutional framework and operation of GIS in state government. Late in 1989 it was decided that more effective service could be provided if AGR was organizationally and physically located within the state's general information technology agency, the Division of Information Technology Services (ITS) in the Department of Administrative Services (DAS). Accordingly, AGR moved to ITS and became known as the AGR Center (AGRC) with its funding totally determined by fees for service. It was also determined that the state needed GIS coordination and leadership, and that this function should remain in OPB. A State GIS Coordinator position was established in OPB under the direction of the Information Technology Coordinator, with funding from general appropria-

tions. With these decisions, it was determined that GIS should be handled similarly to the way Utah's state government establishes organizational responsibilities for other information technologies.

Coordination Efforts, Groups and Activities

Utah has had a statewide GIS coordination focus and effort since the early 1980s (see **Origins of State Initiatives**). During the 1991 legislative session, three bills and one resolution were adopted that direct and influence geographic information coordination and development in Utah. These directives reinforced organizational arrangements and statewide geographic information roles and activities that have evolved in Utah over the past decade. Since the early 1980s, Utah has been a leading state regarding the institutionalization of statewide geographic information coordination and development. Utah has a number of GIS coordinating mechanisms with roles and responsibilities described below. As of 1991, Utah is also a leading state in terms of statutory authorization and collaboration between the executive and legislative branches of state government.

House Bill 63 entitled *Utah Information Technology (IT) Coordinator* renamed and strengthened the previously existing Data Processing Coordinator position. The office had been located in the Office of Planning and Budgeting (OPB) since 1980. As provided in the new bill, the IT Coordinator is responsible for the following: developing specific objectives and policies to guide the development of information systems, procedures and standards within the executive branch of state government; establishing uniform IT standards and procedures for interchange of information; establishing policies for costing all services by any state IT cost recovery center; establishing priorities in terms of importance and time sequencing for the development and implementation of information systems; monitoring information systems development; coordinating the preparation and review of agency information technology plans in state government; recommending approval or disapproval and coordinate the acquisition of information technology and telecommunications equipment developing policies to ensure the protection of individual privacy; advising the governor; and maintaining a liaison with the legislative and judicial branches. The IT Coordinator chairs and staffs the Information Tech-
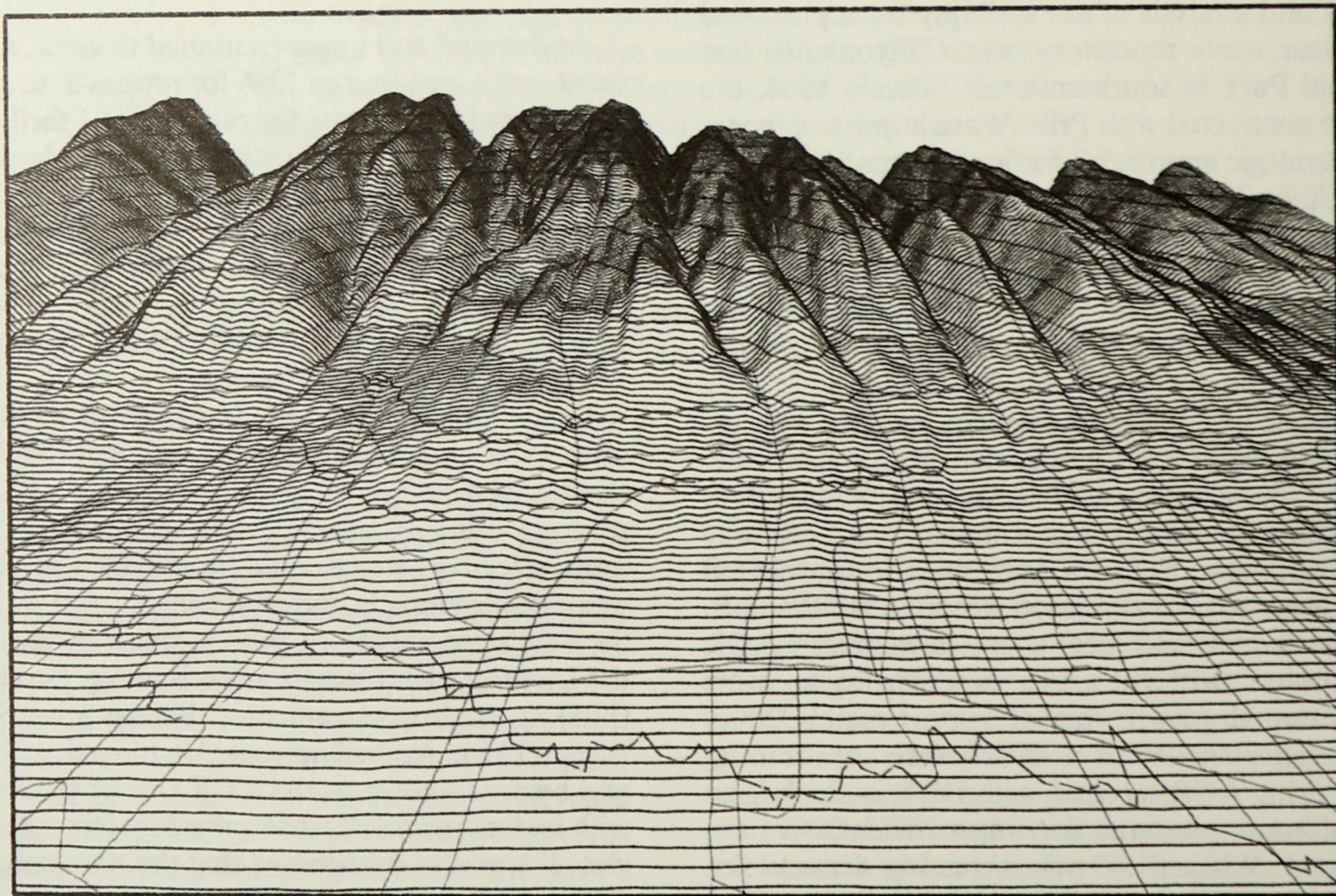
THE WASATCH FRONT by UTAH AGRC

nology Review Committee (ITRC), which has authority over state agencies' IT activities.

Senate Bill 21, entitled *Geographic Information Systems Data Sharing and Conformity* was adopted in 1991 and is the primary bill directing geographic information and GIS activities in Utah. While it does not significantly change conditions in Utah, it does require state agencies to comply with geographic information policies and standards approved by the state's Information Technology Coordinator (ITC), ITRC, and the Automated Geographic Reference Center (AGRC). It also establishes some permanency for institutional arrangements, roles, responsibilities, digital data development, and management and maintenance.

Senate Bill 21 is an exemplary, unique example of consensus between the executive and legislative branches of state government regarding GIS. Following the decision to use GIS for redistricting needs, the legislature decided that GIS is a useful tool to help address natural hazards such as earthquakes. An interim study was conducted in this regard by the State and Local Affairs Interim Committee and the Office of Legislative Research and General Council in the mid-1980s. The staff conducted extensive research and worked with AGRC. A subcommittee was established to consider GIS, and its hearings focused on the establishment of digital databases for use with GIS and the statutory creation of executive branch responsibility to set policy and manage databases. Draft legislation was submitted to all 36 executive branch departments for comment, and all endorsed it. Senate Bill 21 received strong support through its legislative review and passed unanimously in the House and Senate standing committee and on the floor of the House and Senate. It was signed into law on March 20, 1991.

A GIS Coordinator position was established in the Governor's Office of Planning and Budget in November, 1989 to include planning and ordination functions regarding statewide GIS activities. Prior to this time, GIS coordination functions were part of the role of AGRC, which had been located in OPB since 1986 (see **Origins of State Initiatives**, and below). The GIS Coordinator position and its associated expenses were designated to receive funding through general appropriation similar to the IT Coordinator's Office.

The GIS Coordinator position was established to encourage and facilitate effective GIS implementation in the state. The role of the GIS Coordinator is to coordinate planning for GIS activities in state government, and to assist state agencies in developing a strategy, plan and budget for implementing GIS. The coordinator is also responsible for promoting GIS research and development, increasing the awareness and understanding

of sharing information in state government, encouraging data sharing and exchange and cooperatively funded initiatives, and developing GIS policies, procedures and standards. The coordinator is to provide leadership in the use of GIS technology, staff for a GIS Advisory Committee, and is also charged with developing a State Geographic Information Database (SGID) and policies, procedures and standards; and providing GIS capabilities in OPB. The GIS Coordinator's oversight responsibilities for GIS technologies mirror those of the IT Coordinator, which is responsible for reviewing information technology plans and activities in state agencies. Accordingly, the GIS Coordinator has review authority over all acquisition and implementation of GIS in state agencies.

House Bill 63 updates and reaffirms the duties of the director of the Division of Information Technology Services (ITS), located in the Department of Administrative Services. ITS responsibilities described in the bill include the "delivery of efficient and cost-effective data processing and telecommunications services for all state agencies at the lowest practical cost." Data processing and telecommunications services were in different divisions until 1990 when they were merged within ITS.

Senate Bill 21 statutorily establishes the Automated Geographic Reference Center (AGRC) within ITS, where it has organizationally existed since November, 1989. Originally established in the Department of Natural Resources (DNR) in 1981, AGRC was transferred to OPB in 1986, and administratively separated in November, 1989 when the state GIS Coordinator position was established in the IT Coordinator's Office in OPB (see **Origins of State Initiatives**). The bill authorizes AGRC to provide GIS services to state and federal agencies, local political subdivisions, and private persons under rules and policies established by the IT Coordinator; to manage the State Geographic Information Database (SGID); and to provide a standard format, lineage and other requirements for SGID. AGRC's mission is providing consultation, technical assistance, training, initiation and coordination of cooperative projects, as well as contract services such as needs assessments, project and production management, digital data entry, and geographic data modeling and analysis on a cost recovery basis.

One of the most significant portions of Senate Bill 21 describes that the State Geographic Information Database (SGID) will "serve as the central reference for all information contained in any GIS database by any state agency, serve as a clearinghouse and repository for all data layers required by multiple users, and serve as a standard

format for geographic information acquired, purchased or produced by any state agency." Based on the GIS Coordinator's responsibility to develop SGID, the decision was made to contract with AGRC to develop and maintain it. Much of AGRC's work since the November, 1989 reorganization has concentrated on the development and maintenance of SGID, including work to develop digital data through cooperative agreements with other state and federal agencies, such as the March, 1991 memorandum of understanding that created the Utah Soils Digital Database. A similar effort is underway for wetlands data (see **Coordination Efforts, Groups and Activities** and below).

Legislation adopted in 1991 strengthened the authority and oversight roles of the central agencies responsible for information technology and GIS. According to House Bill 63, state agencies are directed to "comply with the policies and standards established by the state IT Coordinator and approved by the Policy Advisory Committee" for all information technology activities. While this authority is similar in other states, and accordingly includes GIS and its related technologies, comprehensive authority regarding digital data used with GIS has so far rarely been addressed in state statutes. Uniquely, Senate Bill 21 requires that "each state agency that acquires, purchases, or produces digital geographic information data shall:

• Inform the (AGR) center of the existence of the data layers and their geographic extent;

• Allow the (AGR) center access to all data classified public, and;

• Comply with any database requirements established by the IT Coordinator."

Agencies have expressed their willingness to participate and comply with these requirements, and particularly to work together in building SGID. AGRC has adopted a team approach to develop standards, and other agencies are contributing efforts to develop standards and data. It has been agreed that only data to be shared among agencies will be in SGID, with agencies responsible for their internal data resources. The GIS Coordinator may contract with AGRC to inventory GIS hardware, software and applications for state agencies, counties and some municipalities in efforts to meet statutory requirements and clearinghouse functions. The IT Coordinator is conducting audits of agencies, and the GIS Coordinator may conduct similar audits regarding GIS.

House Bill 246, the *Government Records Access and Management Act*, was the third important bill adopted in 1991 that influenced geographic information. This bill establishes information practices recognizing the right of privacy in relation to personal data gathered by governmental entities and the public's right of access to information concerning the status of the public's business. The legislation provides standards and requirements for classifying records as public, private, confidential, or protected; and it provides access criteria, procedures, and response times for requests to inspect or obtain records and time limits and procedures for appeals. Fees charged are based on the actual cost of duplicating or compiling a record in a form other than that maintained by the governmental entity. Record series that are classified private, confidential, or protected may be shared by governmental entities under certain circumstances. A State Records Committee and Division of Archives and Records Service establishes and maintains an active program for the collection, management, retention, preservation, classification, and disclosure of records. The effective date of the bill was April 1, 1992.

It is expected that additional legislation will be adopted regarding geographic information in the 1992 session. This legislation will include local government needs and issues, since they are of increasing concern to Utah's coordination groups. The need and opportunity for inter-governmental data sharing will be included because local governments are developing larger scale data that can enhance the state's scale-specific geographic data reference being established by SGID. In 1986, the legislature established the duties and roles of County Surveyors, including establishing all corners of government surveys, maintaining section corners, and keeping a full record of all such surveys. It also requires that private surveyors are resonsible to record any new or changed boundary monuments. The provisions of this legislation establish responsibilities within a state framework.

Coordination Groups

A variety of groups influence data gathering and serve to improve the coordination of geographic information. These groups include those related to information technology in general, some that are specifically related to geographic information and GIS, and others which address natural resources and related data.

The Information Technology Review Committee (ITRC) was most recently addressed by House Bill 63, which increaes its authority to "evaluate and approve or disapprove recommended policies to govern the operation of information technology in state government, and approve or disapprove agency information technology plans." ITRC is primarily composed of department directors of the executive branch, and is chared by the Information Technology Coordinator (see above). A Telecommunications Task Force is addressing the networking of data in the state, including digi-

tal data used in GIS.

The State GIS Advisory Committee was established in July, 1990 and reports to the ITRC. The committee's role is to formulate and recommend proposed GIS policies, procedures and standards; recommend priorities for data collection; review legal and policy issues related to data access; and make recommendations to clarify unresolved issues. In addition, the committee approved the design and management of SGID, and is overseeing its development. Members include program managers and some information technology managers of state agencies that include the Department of Transportation, the Department of Natural Resources, the Department of Environmental Quality, the Department of Agriculture, and the director of ITS. Additional members include representatives of the Office of Legislative Research and General Counsel, Davis County, Utah County, Salt Lake County, Salt Lake City, and the U.S. Geological Survey (USGS) National Mapping Division. It is chaired and staffed by the State GIS Coordinator.

The GIS Advisory Committee meets monthly. Among other efforts, it is addressing the Government Records Access and Management Act of 1991 in terms of its impact on geographic information and GIS (see above). In addition, the committee is increasingly addressing conditions in local governments regarding digital data, since these localities need and are developing data at a greater level of accuracy than state government, and the governments need to work together to share data.

The state has a GIS users group, the GIS Technical Interchange Group (TIG). The TIG serves in an information exchange role and is helping to disseminate information about SGID. Participants include state agencies, federal agencies, local governments, private sector members and academia. It also meets monthly and is chaired by AGRC staff.

Utah also has a State Mapping Advisory Committee (SMAC). Its primary purpose is to provide annual input to USGS for mapping priorities. It meets once per year to meet this need. The State Geologist is the chair of SMAC. The roles and responsibilities of the SMAC are under evaluation and are being considered for possible reorganization. It is anticipated that SMAC will become part of the Utah Geographic Information Council, as will the Utah Geographic Names Council.

The Utah Geographic Information Council (UGIC) evolved in late 1990 and was officially established by House Concurrent Resolution 24, which was adopted by the legislature and approved by the governor on January 29, 1991 (see **Documents Excerpts**). The resolution recognizes that UGIC has been established with representatives

from state and federal agencies, local governments, the private sector, professional societies and universities. It also recognizes that there are coordination needs that can be addressed by the council and also states that the "Legislature and Governor commend and support" the efforts of the council.

UGIC members include groups, companies, federal, state and local agencies, and others with geographic information activities. Local associations such as the Utah League of Cities and Towns and the Utah Association of Counties are also included. Many states have Advisory Commissions on Intergovernmental Relations (ACIR), but Utah's is one of the few involved with state geographic information coordination efforts. ACIR is expected to be a member of UGIC. Other groups represented will include Utah's new Cultural Resources Task Force, a multi-government group specifically addressing cultural resources that include archeology; SMAC; the GIS Advisory Committee; TIG; the Geographic Names Council; and the multi-agency Field Advisory Committee, one which includes all agencies conducting field work regarding mapping. Universities, utilities, the private sector and professional associations are also included, as well as the American Planning Association, Land Surveyors, and others.

The purpose of UGIC is to serve as an umbrella organization with a forum for communication and information exchange about manual and automated geographic information. It will participate in this coordinating role with the other groups in order to reduce redundancy and overlap. For example, SMAC and the Utah Geographic Names Council will most likely become subgroups of UGIC. Additional subgroups, like those for GPS, will be organized with additional focus on the needs of local governments. It is expected that UGIC will have a similar role and function to the New Mexico Geographic Information Council. UGIC will recommend policies and standards for adoption by the ITRC. UGIC participants are signing a Memorandum of Understanding providing for agreement among themselves. The UGIC held its first conference on October 30, 1991 and will continue sponsoring annual conferences.

In addition to the groups listed above which address information technology and geographic information, natural resource-oriented groups that exist in Utah also respond to coordination and data development needs.

The Resource Development Coordinating Committee (RDCC) was established in the early 1980s to provide recommendations to the governor regarding resource development issues in Utah. RDCC reviews and recommends policies on various issues and projects related to natural resources. Its members include program managers from state

agencies that have natural resources responsibilities. Federal and local agencies also attend RDCC's regular meetings. It is chaired by a staff person at the Utah Energy Office and is staffed by the Office of Planning and Budgeting.

Coordinating groups are being formed as state and federal agencies institutionalize cooperative efforts to develop digital data such as for soil and wetlands. The Utah Soils Digital Database (US) includes a Management Committee, Steering Committee and Technical Committee which guide Utah's efforts to develop digital soils data and use common standards and methods in creating related data. A *Memorandum of Understanding Establishing the Utah Soils Digital Database (US)* was signed in March, 1991 by state agencies such as OPB, AGRC, the State Department of Agriculture and the Utah Agricultural Experiment Station, and by federal agencies such as the Soil Conservation Service (SCS), the Bureau of Land Management and the Forest Service. The MOU was initiated because these agencies are "interested in mutually preparing and sharing the Utah Soils Digital Database (US) . . . [and the] MOU is to facilitate the implementation and continued organized management of the US." Digital soils data developed by these agencies will be of similar format and standards when included in SGID. The Steering Committee is chaired by SCS, the Technical Committee is chaired by AGRC, and the Management Committee has not met.

Efforts are also underway to develop a similar cooperative arrangement for digital wetlands data development. State agencies, including most of the divisions of DNR, the Department of Agriculture, OPB, and AGRC, as well as federal agencies such as the U.S. Fish and Wildlife Service, U.S. EPA, SCS, and the U.S. Army Corps of Engineers, will participate in this projects. These agencies will base wetlands work on the policies that already are agreed upon among federal agencies regarding wetlands data development and related standards. A Technical Committee is being established which consists of all state, federal and local agencies interested in establishing standards for the wetlands data layer to be included in SGID. A Management or Steering Committee will be formed and chaired by a representative of the RDCC. The Technical Committee is chaired by AGRC. A MOU is under development for wetlands data which includes provisions for the committees, standards, and data access and contributions.

Policies/Standards

According to 1991 legislation, the Information Technology Review Committee (ITRC) is responsible for adopting policies and standards submitted by the IT Coordinator regarding all information technology, including GIS. State agencies are di-

rected to comply with these requirements and also to "comply with any database requirements instituted for the SGID" when acquiring, purchasing or producing digital geographic information data.

Policies for geographic information and GIS were adopted in 1985 and 1986 through the Office of Planning and Budget (OPB), which includes the Information Technology Coordinator (known as the Data Processing Coordinator until 1991). These policies and procedures found in Utah's *Information Resources Management Handbook*, are currently used and will be under review for update with other IT polices.

The *Policy on Collection of Geographic Information* states that AGRC will provide review and will comment on plans and procedures for project planning and data integration. It further delineates a documentation form for source, format and data product information (see **Documents List**, Policies).

The *Policy on Acquisition of Data Processing Tools for Managing Geographic Information* states that alternatives must be evaluated for computer software and hardware for geographic information. It states that "when possible, the products generated with the proposed tools should be compatible" with AGRC's system and database. "This means that the database or files can be directly integrated into the AGR system or that the acquisition will include the necessary software to convert the information into an appropriate format. The investment that the state has already made in hardware, software, and personnel must be accounted for in any request which includes tools that are not compatible with the existing system."

The *Policy to Adopt Statewide Base Maps* states that "maps which may have statewide value shall be identified and designated as 'official' state maps and shall be added to the state's geographic database." It states that a technical review of any proposed "state" map will be made by AGRC "to insure consistency and compatibility." The state's Resource Development Coordinating Committee

shall make recommendations to the State Planning Coordinator for such map designation and to then be "placed on a priority list for digitizing."

With statutory authority established within ITRC for hardware and software standards including GIS, SUN was adopted as the "work station of choice" for GIS. This standard implies that other vendors' workstations may be purchased, but must be approved as meeting this standard. Similarly, ITRC also adopted ARC/INFO as a software standard, although as with the workstations, other software has been approved. This software standard has been in force since 1986 when AGRC expanded its facilities to respond to a request for proposals (RFP). The workstation standard was established following a RFP issued by the GIS Coordinator in February, 1990 for a "High-Performance Workstation" contract for GIS applications. The RFP described the state's desire to "establish the foundation for . . . [and] the long term GIS objective of developing connectivity with distributed computing environments between state and local governments." As state agencies and local governments frequently make purchases from state contracts and because they served on the review panel for the RFP award, state standards influence activities in localities.

Authority for data standards was renewed in Senate Bill 21 (adopted in 1991), with state agencies directed to "comply with any database requirements"established by ITRC. Accordingly, the *Utah State Geographic Information Database (SGID) Users Guide*, includes database guidelines governing the structure of the State Geographic Information Database (SGID) and its layers. These guidelines apply to data which is in digital form, including naming conventions, file organization, graphic data, attribute data, symbology, data quality ratings that have been assigned of each data layer by AGRC, and lineage. The guide also includes agency guidelines for participation in SGID.

Standards are also being developed and authorized by cooperative memoranda of understanding signed by state and federal agencies and others regarding individual data layers. For example, such provisions were provided in the MOU signed by six federal agencies to jointly develop the Utah Soils Digital Database.

3 GIS in State Government

Utah statutes provide for two complimentary entities in state government to have statewide roles and responsibilities regarding information technol-

ogy (IT) and GIS. In addition, various functional agencies also complete GIS activities and work with these entities, as directed by statute.

The **Office of Planning and Budgeting** includes the **Information Technology** (IT) Coordinator, most recently established by House Bill 63 in 1991. The IT Coordinator is responsible for statewide IT policy, planning and standards in the executive branch, and with the Information Technology Review Committee (ITRC), the coordinator approves agency-level activities in this regard. The IT Coordinator's office includes eight staff members and it chairs and staffs the ITRC.

Utah's **GIS Coordinator** was created in the IT Coordinator's office in November, 1989 to conduct statewide GIS planning and coordination functions similar to the IT Coordinator. Previously, related coordination functions were conducted by the Automated Geographic Reference Center (AGRC), which had been located in OPB since 1986 (see **Origins of State Initiatives** and **Coordination Efforts, Groups and Activities**). The GIS Coordinator position and associated expenses are funded by general appropriation similar to the IT Coordinator's Office. The initial annual budget was approximately $200,000, which covers personnel costs and was used to purchase a SUN workstation and ARC/INFO software used by the coordinator to connect to the State Geographic Information Database (SGID). To help meet the coordinator's responsibility to develop the SGID, $80,000 of these funds was contracted to AGRC for developing SGID. Support for OPB GIS needs is also provided by the Coordinator. Efforts beginning in 1991 concentrated on identifying and gathering information that can be used with GIS and included in SGID.

The **Department of Administrative Services** includes the **Division of Information Technology Services** (ITS). ITS provides data processing and telecommunications services for state agencies on a cost recovery basis.

ITS has included the **Automated Geographic Reference Center** (AGRC) since November 1989, and was formally authorized by Senate Bill 21 in 1991. The bill authorizes AGRC's responsibilities regarding SGID and affirms AGRC's establishment as a service bureau providing GIS services on a fee for service basis similar to ITS. It provides GIS consultation, technical assistance, training, initiation and coordination of cooperative projects, and contract services. Those services include needs assessments, feasibility and implementation plans, database development, map compilation and design, project and production management, digital data entry, geographic data modeling and analysis, and color electrostatic plotting. Services are provided to state, federal and

local agencies, including the U.S. Forest Service (USFS) and Soil Conservation Service (SCS), as well as in private sector companies. In addition, AGRC maintains inventories of GIS hardware, software and applications for state agencies and counties and for some municipalities.

AGRC's annual budget is currently approximately $450,000. Without a general appropriation as AGRC had when it was located in OPB prior to November 1989, (see **Origins of State Initiatives**) the majority of AGRC's funding is from fees. The remainder is currently subsidized by ITS and through a contract with the GIS Coordinator to develop and manage SGID. The initial contract was for $80,000, and AGRC expects annual maintenance costs for SGID of approximately $50,000. AGRC receives $25,000 per year from training services. AGRC's budget previously has been as high as $600,000 in the late 1980s when it had GIS coordination functions. Plans are underway for AGRC to be entirely self sufficient in the future.

AGRC includes eight professional staff members, all classified as data processing and information analysts, and who provide GIS services to clients. Training is provided by AGRC, including an Executive Overview in a half-day seminar, and a Basic Class, which is a five-day course. The first two days provide an overview and review of concepts, and the latter three days provide ARC/INFO specific training. Specialized modules of one or two day classes are also provided, based on demand. These classes include ARCPLOT, ARCEDIT, Data Entry, INFO, COGO, NETWORK, TIN, AML, Modeling and Analysis, Systems and Database, Data Conversion, and Map Graphics. Revenue from training is increasing.

AGRC uses ARC/INFO, EPPL-6, and DTAP-Terrain software on a Prime 4150 supporting 17 terminals, with six plotters and six digitizers at AGRC and remote sites. Three SUN workstations were added recently as SUN was selected as the "work station of choice" and a standard for state government (see **Coordination Efforts, Groups and Activities**, Policies/Standards). Personal computers with pcARC/INFO also access the system. The Prime has been networked with the ITS's IBM mainframe, telecommunications system and six other sites. Agencies with remote terminals interfaced with AGRC's Prime include three divisions of the Department of Natural Resources (DNR), and with federal agencies such as USFS and SCS. The Department of Environmental Quality has a Prime 4450 which is connected to AGRC's Prime via Prime NET.

Much of AGRC's work since the November, 1989 reorganization has concentrated on the development and maintenance of the State Geographic Information Database (SGID), which has been enlarged since the early 1980s. It was officially funded beginning in July 1990 through a contract issued by the State GIS Coordinator, and is authorized by the legislature within Senate Bill 21. SGID has two functions. SGID is authorized as the central repository for some GIS data. It is also a clearinghouse and reference to data maintained by other agencies and required for multiple users. SGID provides a "standard format for geographic information acquired, purchased or produced by any state agency." It was the first attempt to inventory data available from other GIS sites in the state. GIS users in Utah have agreed that GIS data should be distributed and that agencies need to maintain their own data. Emphasis is on developing SGID as a repository and clearinghouse, with the current focus on developing telecommunications linkages between AGRC and participating agencies.

The SGID infrastructure was complete in 1990, and includes four parts: the database itself; a menu driven query interface; a set of software tools for database administration; and the *Utah State Geographic Information Database (SGID) Users Guide*, which is updated quarterly. The guide provides an off-line dictionary and catalog with instructions for using the menu query system and for ordering data. It describes AGRC and SGID, including its individual data layers, functionality, organization, feature attributes, standards, database administration, and guidelines for participation. One copy of the guide is provided free of charge to all federal, state and local agencies operating in Utah. Copies for private organizations and additional guides for governmental agencies are available for an annual fee of $75, which also covers all quarterly updates.

SGID is based on the ARC/INFO LIBRARIAN tile structure utilizing this applications software. SGID can be accessed by remote terminal through direct link to AGRC's Prime computer, via either the Database Query System, ARC/INFO software, or when ordering data from AGRC.

SGID includes information about federal, state and local data resources, and is being developed as a repository and clearinghouse as called for in the bill. A data rating scheme is used for data holdings. SGID base scales are 1:500,000, 1:100,000 and 1:24,000, with some data at larger scales. AGRC has statewide DLG coverage at the 1:500,000 and 1:100,000 scales, with some data coverage at the 1:24,000 scale that were developed for specific projects. Efforts are underway to complete some of these data layers, such as for soils, wetlands, land cover, and the Public Land Survey System (PLSS). Other data will be available through SGID in the future. For example, the

Office of Legislative Research and General Council will be giving TIGER data to AGRC. Some interest in a digital layer of all of Utah's special districts has been expressed. The Senate Local affairs Interim Committee, which created Senate Bill 21, is recommending $50,000 be appropriated to create a digital data layer of all local taxing districts. While AGRC serves as a clearinghouse for digital data GIS use, efforts in Utah's universities include maintaining inventories and processing satellite imagery about the state.

Cooperative agreements with other state and federal agencies are being sought as a way to formalize the willingness to cooperate and to institutionalize mechanisms for developing data and agreement on standards and procedures for data to be shared and included in SGID. For example, a memorandum of understanding was signed by six state and federal agencies to create the Utah Soils Digital Database (US) in March, 1991. This MOU created coordinating committees to direct and carry out work (see **Coordination Efforts, Groups and Activities,** Coordination Groups). While additional funding has not been authorized for soils data, it is expected that the MOU will assist in these efforts. To date, each of the six agencies have developed some digital soils data and AGRC will serve as a clearinghouse for this data. For example, part of Utah's Tooele County was the first area of the country to have a digital soils survey prepared by SCS. According to the MOU, each agency will use SCS standards for digital data, and "each agency will be responsible for assigning a rating to data submitted by the agency," with the MOU establishing criteria to rate such digitized data. Efforts are also underway to develop similar cooperative arrangements with federal and state agencies for digital wetlands data development. This effort will be based on cooperative arrangements already in existence among federal agencies.

AGRC is working on various applications and projects through contracts with state and federal agencies. A major continuing project has been the Bridger-Teton Forest Plan Implementation with the U.S. Forest Service. AGRC also provides technical support for reapportionment activities of the Utah Legislature. It may be used to develop extensive earthquake information using GIS for the legislature. Contract work is also being done for the Department of Environmental Quality (DEQ) for a groundwater vulnerability analysis in Salt Lake County and to assist in hazardous waste siting. Telecommunications infrastructure applications may be conducted for ITS and the Telecommunications Task Force. In a past effort, microwave sites and circuits were mapped for ITS and the Task Force to show present and proposed

facilities. A line-of-sight analysis was also conducted to evaluate the feasibility of proposed microwave sites. In the past, AGRC has worked with the State Tax Commission to conduct analyses of the effects of alternative taxing district boundaries on the equitability of tax collections. AGRC is working with the Department of Public Safety's Division of Comprehensive Emergency Management regarding nerve gas disposal for evacuation models. AGRC also conducts a variety of small projects resulting in copies of existing or customized maps.

The **Department of Natural Resources** (DNR) is the primary natural resources agency in Utah. It has included various divisions with GIS activities since 1982, when the Automated Geographic Reference Center (AGRC) was initially established in DNR. AGRC was transferred to the Office of Planning and Budget (OPB) in 1986 because there was growing interest in meeting statewide needs; however, natural resources applications continued to be developed. DNR is currently developing a department-wide approach to GIS, including GIS implementation as part of DNR's annual data processing plan.

DNR currently uses the Division of Information Technology Services' (ITS) mainframe computer, and also has a VS 300 and a NCR minicomputer. A T1 line was installed to connect DNR to most of its divisions. In 1991 DNR installed an Ethernet Network, Hewlett Packard workstations, and ARC/INFO software. Currently, DNR uses the AGRC's Prime computer, but the plan includes minimizing its use, and eventually converting to workstations. In addition, the plan provides that DNR will develop a library of the agency's digital data and then access and exchange data in the State Geographic Information Database (SGID) maintained by AGRC. Current GIS related expenditures in DNR are approximately $220,000 per year, with the equivalent of four professional staff positions working on GIS.

The **Division of Water Resources** has surface and groundwater responsibilities and was one of the state's earliest users of geographic information. It began development of geographic information in the mid-1960s to help develop Utah's state water plan. Mapping of the state's 11 water basins has been underway since 1965. Beginning in 1983, the division decided to conduct in-house flyovers of the state using 35mm slides and to then project them on the USGS quadrangle maps. This data is being digitized in ARC/INFO and stored at AGRC, along with other digital data under development. The division has a terminal connected to AGRC's Prime computer. The division has the equivalent of 1.5 professional staff members working on GIS, with an annual expense of

$90,000 related to GIS.

In addition, the Land Use Mapping Section includes six staff members who conduct field mapping work. The program workers completed mapping the Great Basin, including the Bear River drainage, in 1990. The division has a cooperative agreement with the U.S. Bureau of Reclamation to complete the mapping of the portion of the Colorado River which is in Utah. This mapping and much of Utah's other water-related mapping is conducted to support irrigated agriculture. The division is also working with the U.S. Geological Survey to use GIS for groundwater applications in Salt Lake County and Cache County.

The **Division of Water Rights** is in the process of developing digital data in its water rights system, including boundaries and with close attention to legal data. The division hopes to overlay data from the Division of Water Resources to help enforce water rights and to regulate water use. The division formerly used a terminal connected to AGRC's Prime computer, but has recently purchased an Apollo workstation and ARC/INFO for in-house use.

The **Division of Wildlife Resources** is using GIS in its main office and regional offices. It has one full-time staff person working on GIS, with seven staff members working part-time on digital data development. The division has seven personal computers with pcARC/INFO, including two in the Salt Lake office and five in the regional offices that are used by habitat managers.

The division received a grant from U.S. EPA for wetlands mapping. The U.S. Fish and Wildlife (FWS) Division, the U.S. Forest Service, the Bureau of Land Management, the National Park Service, and Utah State University also purchased some imagery and are helping in the project. The division is digitizing FWS's National Wetlands Inventory maps and all properties owned by the division.

The division has mapped the locations of all threatened and endangered species in the state, as well as critical habitat areas for big and upland game. It is working with the U.S. Fish and Wildlife Service and Utah State University to map vegetation and species using gap analysis similar to the state of Idaho (see Idaho profile). In Utah's case, the data will be created using Landsat thematic mapper data, and wildlife data will be derived from Utah's Fish and Wildlife Information System, which is a tabular system maintained by the division. These efforts are in cooperation with Colorado's Division of Wildlife, and Utah workers are also conducting gap analysis work for the state of Nevada.

The **Division of State Lands and Forestry** is planning to use GIS to assist in state lands

management. It hired a full-time person to work with GIS and recently received an appropriation to spend up to $120,000 through restricted funding from the Land Grant Maintenance Fund in order to hire an additional full-time staff person and to purchase a Hewlett Packard workstation.

Additional DNR divisions are planning to participate in the department-wide GIS effort, including the Geological Survey, the Division of Parks and Recreation and the Heritage Program.

The **Department of Environmental Quality** (DEQ) was created in early 1991 from the Department of Health's Division of Environmental Quality. DEQ has a Data Processing Steering Committee and Data Processing Technical Advisory Committee which report to DEQ's director. DEQ utilizes GIS to support specific programs but also plans to meet agency-wide needs, such as providing support for DEQ's policy staff.

Approximately two full-time staff members are dedicated to GIS, with an additional annual budget of $27,000, 90% of which is state-funded and the remaining 10% is from U.S. EPA. U.S. EPA gave DEQ a Prime 4450 in 1989, and state funds were used for software and peripherals. Currently the Prime has 20 terminals, including four that use GIS. The system is linked with AGRC's system. In addition, DEQ's Bureau of Air Quality recently acquired another Prime.

DEQ's major GIS effort is a Groundwater Vulnerability Study being conducted for Salt Lake 10 in cooperation with AGRC. The project will determine the potential for contamination of groundwater by certain facilities, such as dry cleaning businesses. This project is similar to work that was conducted for Denver. AGR is also conducting contract work for DEQ to perform address matching for hazardous waste siting. It is expected that GIS will be used for site suitability for waste facilities, and in general, as an analytic and communications tool.

The **Department of Agriculture** is using SPANS software for pest control and for grain, seed and feed inspection. The department required software for dynamic modeling, and this selection was approved by the GIS Coordinator. The department exchanges data with SGID.

The **Department of Community and Economic Development**'s Division of State History began a project with the U.S. Forest Service and AGR in 1987 to identify archeological sites and other areas most likely to be looted. Determination of vulnerability to looting is based on calculations of access and attractiveness. The division has a remote terminal to access data in SGID.

The **Department of Public Safety**'s Division of Comprehensive Emergency Management is working with AGRC regarding GIS and data develop-

ment. The division is using a DEC 3100 with Tek-tronix workstations. It is accessing SGID and using the Federal Emergency Management Agency's IEMIS software. One of its primary projects concerned nerve gas disposal for evacuation models in work that was conducted with the U.S. Army in Tooele County.

The **Department of Transportation** (DOT) is using DIGIMAP software on 50 workstations for engineering CAD applications and some cartographic purposes. Consideration is being given to using the software for GIS management and planning applications, or to purchase additional software. DOT maintains a county map series and is currently digitizing these maps. DOT is exchanging digital data with SGID.

The **Office of Legislative Research and General Counsel** became involved with GIS in the mid-1980s as a result of redistricting needs and the need to analyze potential legislation for natural hazards such as earthquakes. It has uniquely designated a GIS coordinator who works closely with AGRC. The office has two SUN workstations with ARC/INFO software and color printers to support the reapportionment process. AGRC is providing assistance in this effort by writing some macros for the software and by processing the Census TIGER line data. After redistricting, the office will use the system for general research needs and mapping. It is anticipated the workstations will access AGRC's data, and the office will give TIGER data to AGRC for maintenance with SGID. The Utah Legislature will be considering funding of further digital data development, such as for earthquake and local taxing districts.

Academic Activities

Utah has four universities active in GIS and remote sensing and which participate in some state government activities. The **University of Utah**'s Geography Department started a 12-quarter series of class work at the graduate level and has installed a new GIS teaching laboratory. The university was awarded funding from the National Science Foundation for the Science and Technology Center for Computer Graphics and Scientific Visualization. Funding is also being provided by the Defense Advanced Research Projects Agency and by four corporate sponsors. The center will be working collaboratively with researchers at the nation's four super computer centers that also receive funding from the National Science Foundation and other academic institutions.

Utah State University includes the College of Natural Resources. Utah State's Geography Department has GIS and remote sensing laboratories, and is actively working with DNR and the Department of Agriculture. **Brigham Young University**'s Geography Department recently

received $300,000 worth of hardware and software from Intergraph Corporation. These funds are being used to develop teaching and research facilities. **Weber State University** also has GIS classes and facilities.

4 Documents List

Directive

Senate Bill 21, **Geographic Information Systems Data Sharing and Conformity**, 1991.

This act was established to create a state geographic information base and to provide for its contents and management, and mandates state agencies to comply with policies and standards approved by the state's Information Technology Coordinator (ITC). It establishes the Automated Geographic Reference Center (AGRC) in the Division of Information Technology (ITC) which is within the Department of Administrative Services. The bill provides that AGRC provide GIS services to state and federal agencies, local political subdivisions, and private persons under rules and policies established by ITC. It is also to manage the State Geographic Information Database (SGID), and provide standard format, lineage and other requirements for the database. The bill provides that SGID serve as the "central reference for all information contained in any GIS database by any state agency, serve as a clearinghouse and repository for all data layers required by multiple users, and serve as a standard format for geographic information acquired, purchased or produced by any state agency." The bill further requires that "each state agency that acquires, purchases, or produces digital geographic information data shall: inform the center of the existence of the data layers and their geographic extent, allow the center access to all data classified public, and comply with any database requirements established by ITRC."

House Concurrent Resolution 24, **Utah Geographic Information Council**, 1991.

This resolution recognizes that the Utah Geographic Information Council has been established with representatives from state and federal agencies, local governments, the private sector, professional societies and universities. It also recognizes there are coordination needs that can be addressed by the council and also states that the "Legislature and Governor commend and support" the efforts of the council (see **Documents Excerpts**).

House Bill 63, **Utah Information Technology Coordinator**, 1991.

This bill provides for the state Information Technology (IT) Coordinator and establishes the

roles of this position. The coordinator is responsible for developing specific objectives and policies to guide the development of information systems, procedures and standards within state government; establishing uniform IT standards and procedures for interchange of information; establishing policies for costing all services by any state IT cost recovery center; setting priorities in terms of importance and time sequencing for the development and implementation of information systems; monitoring information systems development; coordinating the preparation and review of agency information technology plans in state government; recommending approval or disapproval and coordinating the acquisition of information technology and telecommunications equipment; developing policies to ensure the protection of individual privacy; advising the governor; and maintaining a liaison with the legislative and judicial branches. The bill also reaffirms the duties of the director of the Division of Information Technology Services, including the "delivery of efficient and cost-effective data processing and telecommunications services for all state agencies at the lowest practical cost." It also reauthorizes the Policy Advisory Committee, (known as the Information Technology Review Committee), and increases its authority to "evaluate and approve or disapprove recommended policies to govern the operation of information technology in state government, and approve or disapprove agency information technology plans." State agencies are directed to "comply with the policies and standards established by the state IT coordinator and approved by the Policy Advisory Committee."

House Bill 246, **Government Records Access and Management Act**, 1991.

This bill establishes information practices that recognize the right of privacy in relation to personal data gathered by governmental entities and the public's right of access to information concerning public business. The legislation provides standards and requirements for the classification of records as public, private, confidential, or protected; and provides access criteria, procedures, and response times for requests to inspect or obtain records and time limits and procedures for appeals. Fees charged are based on the actual cost of duplicating or compiling a record in a form other than that maintained by the governmental agency. Record series classified as private, confidential, or protected may be shared by governmental entities under certain circumstances. A State Records Committee and Division of Archives and Records Service is created to establish and maintain an active program for the collection, management, retention, preservation, classification, and disclosure of records. The bill became

effective on April 1, 1992.

Utah Chapter 23, 17-23-1 to 18, **Establishing the Duties and Roles of County Surveyors**, 1986.

This legislation stipulates that county surveyors are responsible for establishing all corners of government surveys, maintaining section corners, and keeping a full record of all such surveys. Private surveyors are also responsible to record any new or changed boundary monuments within 90 days of such establishment or reestablishment. Contents of these filings are also specifically delineated, and all surveys in the state must comply. The statute empowers County Surveyors with this authority and directs the state to recognize that authority. Accordingly, if questions arise, people are directed to go to the county for such information, particularly as it relates to legal issues.

Memorandum of Understanding

Memorandum of Understanding Establishing the Utah Soils Digital Database (US), March, 1991.

This memorandum of understanding (MOU) was signed by state agencies including OPB, AGRC, State Department of Agriculture and the Utah Agricultural Experiment Station, and federal agencies including the Soil Conservation Service (SCS), the Bureau of Land Management and the Forest Service. The MOU was initiated because these agencies are "interested in mutually preparing and sharing the Utah Soils Digital Database (US) ... [and the] MOU is to facilitate the implementation and continued organized management of the US." The MOU establishes three committees to furnish guidance to the US project, including the Management, Steering and Technical Committees. As each of these agencies are digitizing soils data in Utah, the MOU formalizes the willingness to share data. It also provides that agencies will use the same standards, which are the same as those used by SCS. Further, "each agency will be responsible for assigning a rating to data submitted by the agency," and the MOU establishes criteria to rate such digitized data.

Policies

Policy on Collection of Geographic Information, *Information Resources Management Handbook*, Utah Office of Planning and Budget, July, 1986.

This document established the following policies and procedures, and also delineated a documentation form for source, format and data product information.

Policies:

"1. When possible, files or data bases of digitized geographic data and associated attribute files should be compatible with the state's geographic

information data base managed by the AGR Center.

2. All proposals to collect and digitize data with geographic characteristics must be reviewed by the State Planning Coordinator's Office, to determine if data files are compatible with the AGR system.

3. The data collector will provide a copy of the data base and/or files that can be directly integrated into the AGR data base. Appropriate documentation must accompany the information."

Procedures:

"1. In the initial stages of planning for a project to collect and digitize geographic data, the agency should contact the 'AGR Center' and present an initial description of the project for which the data will be collected and/or a description of the data itself.

2. If the information to be collected has potential secondary use, the agency will prepare a preliminary plan defining the purpose of the project and the process for data integration."

Policy on Acquisition of Data Processing Tools for Managing Geographic Information, *Information Resources Management Handbook*, Utah Office of Planning and Budget, July, 1986.

This document states that alternatives for computer software and hardware for geographic information must be evaluated. It states that "when possible, the products generated with the proposed tools should be compatible with the state's Automated Geographic Referencing (AGR) system for geographic information data base. This means that the database or files can be directly integrated into the AGR system or that the acquisition will include the necessary software to convert the information into an appropriate format. The investment that the state has already made in hardware, software, and personnel must be accounted for in any request which includes tools that are not compatible with the existing system."

Policy to Adopt Statewide Base Maps, *Information Resources Management Handbook*, Utah Office of Planning and Budget, July, 1986.

This policy states that "maps which may have statewide value shall be identified and designated as 'official' state maps and shall be added to the state's geographic data base." It states that a technical review of any proposed "state" map "will be made by the state's Automated Geographic Referencing (AGR) Center . . . to insure consistency and compatibility." The state's Resource Development Coordinating Committee shall make recommendations to the State Planning Coordinator for such map designation and which then will be "placed on a priority list for digitizing."

Reports/Publications

State of Utah Request for Proposals for a High-Performance Workstation, (for GIS appli-

cations), Issued by the Division of Purchasing, February, 1990.

This request for proposals (RFP) describes the state's workstation needs and reports that it is seeking a firm to "supply a high-performance workstation that is capable of supporting ESRI's ARC/INFO software for GIS applications . . . to effectively operate all modules and applications offered by ESRI for geoprocessing." It describes the desire to "establish the foundation for . . . the long term GIS objective of developing connectivity with distributed computing environments between state and local governments." The evaluation committee was comprised of "a team of GIS, data processing and purchasing professionals selected from the State, County and City governments."

Utah State Geographic Information Database (SGID) Users Guide, Utah Department of Administrative Services, Division of Information Technology Services, Automated Geographic Reference Center, Second Edition, April, 1991, updated quarterly.

This users guide includes a description of Utah's Automated Geographic Reference Center's (AGRC) database for GIS, known as the State Geographic Information Database (SGID). It includes SGID's functionality, geographic and thematic organization; its feature attributes, and database administration. Part two of the guide describes how SGID information can be accessed, including by direct link to the AGRC Prime computer through either the Database Query System or use of ARC/INFO software, or by ordering data from AGRC. Database standards governing the structure of the SGID database and its layers are also provided in the users guide. These standards apply to data in a digital form, and address naming conventions, file organization, graphic data, attribute data, symbology, data quality ratings that have been assigned of each data layer by AGRC, and lineage.

Part four of the guide includes information on individual data layers and is expanding as new data is added to SGID. For each data layer, information includes summary description, data standards, data quality rating and other considerations, including legal constraints, sensitivity issues, currency, special charges, fees or other requirements regarding release of data. Part five includes agency guidelines for participation in SGID. Appendixes include primary and secondary data layer categories and subcategories, screen menu usage, and agency listings. Forms and a rate schedule are also included. One copy of the guide is provided free of charge to all federal, state and local agencies operating in Utah. Copies for private organizations and additional guides for governmental agencies are available for an annual fee of $75,

which includes all quarterly updates.

State of Utah Request for Proposals: GIS Integration and Growth, Issued by the Office of Planning and Budget, October, 1986.

The RFP provides background information about GIS activities in the state, and requests proposals to "facilitate the implementation of a strategy to continue to systematically meet the demand for integration and use of automated methods for capture, analysis and display of geographically referenced spatial data."

Papers

Legislation for the Creation of a State Geographic Information Database in Utah, Challender, Stuart R., Dennis B. Goreham, Utah Automated Geographic Reference Center, North, Richard, Office of Legislative Research and General Counsel, March, 1991.

This paper reviews the background of activities in Utah leading to the adoption of Senate Bill 21 by the legislature in 1991. The paper also describes the bill and its benefits, implementation issues and efforts in Utah, and potential future activities.

Quantifying and Modeling Archeological Looting: The Utah Interagency GIS Project, Wylie, Jerry, U.S. Forest Service, and Bob Nagel, State of Utah, May 5, 1989.

This paper describes the preliminary results of a GIS project designed to identify archeological sites and areas most likely to be looted. Vulnerability to looting is based on calculations of access and attractiveness. Site characteristics and predictions are summarized, and a proposed field test

of the system is outlined.

Utah Digital Geographic Information Database: Digital Data Threshold Standards -DRAFT, Jones, Brent R., Automated Geographic Reference, December, 1987.

This paper explains that different uses of GIS data make up the conceptual scheme of Utah's database design. It describes how digital data is stored in partitioned areas based on quality, resolution, and theme. This type of storage is accomplished by determining the qualitative characteristics of the individual digital data sets and then categorizing them by a described set of standards.

Database Design for Effective Data Integration in a Shared GIS: The Utah Automated Geographic Reference "Target" Design, Jones, Brent R., Automated Geographic Reference, May, 1987.

This paper discusses the Automated Geographic Reference Center's (AGRC) database development and management with an emphasis on the physical structure of the design. Database design considerations and methods of storing wide varieties of geographic data are described. Included are examples of naming conventions used for storing data. A brief description of AGR's system, its resources and use is also included. Suggestions on managing data by delegating varying responsibilities are given.

Newsletter

Survey Notes, Utah Geological and Mineral Survey, J. Stringfellow, Editor, Published quarterly.

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Document Excerpts

House Concurrent Resolution 24 **Utah Geographic Information Council** General Session, 1991

A CONCURRENT RESOLUTION OF THE LEGISLATURE AND THE GOVERNOR ENDORSING THE CREATION AND GOALS OF THE UTAH GEOGRAPHIC INFORMATION COUNCIL.

Be it resolved by the Legislature of the state of Utah, the governor concurring therein:

WHEREAS there is a need to promote a spirit of cooperation among state, federal, and local agencies and the private sector in addressing geographic data and information needs and services in Utah;

WHEREAS it benefits both public and private parties to coordinate and share geographic information;

WHEREAS there is a need to promote the coordination of programs, policies, technologies, and resources to maximize opportunities and minimize duplication of effort;

WHEREAS there is a need for a forum to coordinate geographic information;

WHEREAS there is a need to identify and provide recommendations to federal, state and local agencies and the private sector on mapping and geographic data need, priorities and standards;

WHEREAS addressing these needs can have a long-term economic benefit to the citizens of Utah;

WHEREAS the Utah Geographic Information Council has been established with representatives from state and federal agencies, local governments, the private sector, professional societies and universities; and

WHEREAS the Utah Geographic Information Council has stated that its mission is to fill these needs:

NOW, THEREFORE, BE IT RESOLVED that the Legislature of the state of Utah, the Governor concurring therein, recognize the commendable efforts of the Utah Geographic Information Council to address the needs for coordination, cooperation, and guidance in all aspects of geographic information in Utah.

BE IT FURTHER RESOLVED that the Legislature and the Governor commend and support the efforts of the Utah Geographic Informateon Council to include in its activities all state and federal agencies, local governments, professional groups, private concerns, and universities that have interests in geographic information.